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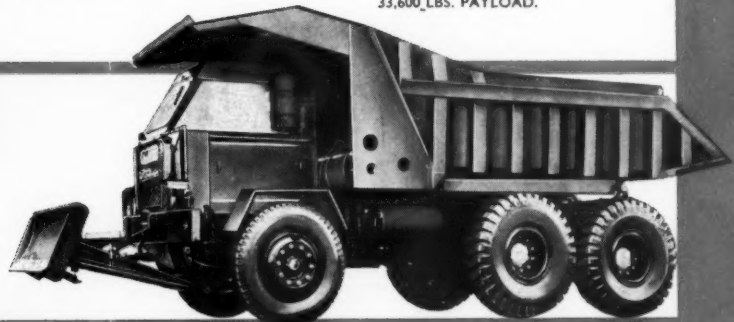


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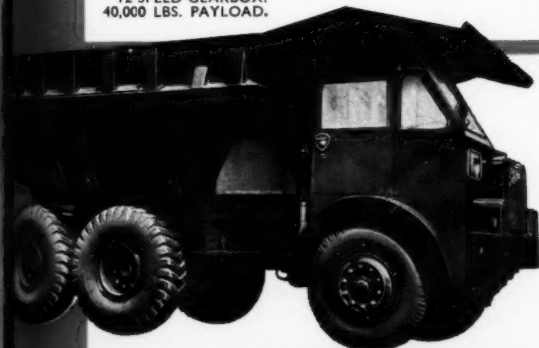


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London, August 14, 1959

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Prospects for Australia's Aluminium Industry

ALTHOUGH the existence of bauxite in Australia has been known for many years, it is only during the last four years that areas in North Australia have come to be regarded as among the major potential sources of this ore in the world.

The first investigation of the Melville Bay area in the Northern Territory was undertaken as recently as 1955 by the New Guinea Resources Prospecting Co. (owned to the extent of 51 per cent by the Federal Government and 49 per cent by the British Aluminium Co. Ltd.), who mounted a small-scale survey under the control of G. A. Daniels, to test by boreholes the quality of the laterites and to search for accumulation of aluminous laterites. This survey established the existence in quantity of pisolitic bauxite averaging 48 per cent alumina and 3-4 per cent silica on the Gove Peninsula, which lies east of Melville Bay and west of Cape Arnhem.

In the same year H. J. Evans, a geologist with Consolidated Zinc Pty. Ltd., when visiting the east coast of Cape York, realised the tremendous potential of the pisolitic laterites in that region. Subsequent investigation by Enterprise Exploration Pty. Ltd., a subsidiary of Consolidated Zinc, showed that these deposits were mainly metal grade bauxite. A new company — Commonwealth Aluminium Corporation Pty. Ltd. (owned 50 per cent by Consolidated Zinc and 50 per cent by British Aluminium) — was formed to follow up the examination and use of these bauxite ores.

The Cape York deposits, the methods used in their exploration, and the development programme were the subject of a paper presented by H. J. Evans at a symposium entitled "Aluminium in Australia", which was held in Brisbane on July 16 and 17, 1959. The first of two extracts from this paper will be found on page 141.

From its title, it is apparent that the purpose of the symposium was to present a comprehensive and authoritative picture of the aluminium industry in Australia. The organizers were the Australasian Institute of Mining and Metallurgy, Southern Queensland Branch, the Australian Institute of Metals, Brisbane Branch, and the Royal Australian Chemical Institute, Queensland Branch. The papers presented cover an extremely wide field and enable the national and international significance of the Cape York bauxite discoveries to be assessed against the background of the world's present and potential aluminium needs.

It is now estimated that the bauxite reserves in Northern Queensland may amount to more than 3,000,000,000 l. tons, of which at least 2,000,000,000 tons will be of metal grade averaging 55 per cent alumina, 3.5 per cent reactive silicon, and 1.5 per cent quartz. In addition, a further 21,000,000 tons is known to occur in all States of Australia except that of Southern Australia. At 3,000,000,000 tons, Australia's reserves of bauxite, estimated and inferred, are equivalent to 29.7 per cent of the world total of

10,155,000,000 tons. These figures were given in a review of the world's bauxite deposits presented by G. A. Daniels and S. F. Derbyshire, resident representative and consultant in Australia respectively for British Aluminium.

The potentialities for expansion of the aluminium industry in Australia were examined by Dr. J. A. Dunn in a paper entitled "Australia and World Aluminium". Dr. Dunn sees no prospect of a permanent market for Australian bauxite in Europe or in the U.S., as one can see it at present, nor within the space of the 1960's can he see a market for Australian alumina in Europe, unless political problems in Africa were to inhibit or delay the development of the larger projects there. On the other hand, an alumina market on the west coast of North America is seen as a reasonable possibility.

It is further concluded that existing world capacity and new projected capacity will amply take care of world aluminium requirements up to the late 1960's and perhaps into the early 1970's. There is little possibility of Australian metal entering into world industry in a big way during the interval. Thereafter, Australia's competitive ability will depend on the extent to which African projects, based on African bauxites and low-cost power, can be developed.

In Dr. Dunn's view, the obvious scope for aluminium reduction in Australia is provided by the domestic market itself. In 1959, Australia requires just on 30,000 tons — well in excess of Bell Bay's capacity of 13,000 tons, which has not so far been attained. Australia's consumption per head is among the lowest of western countries; to be comparable with West European countries and Canada, Australia's total consumption should at present be 40,000 tons a year, and to be comparable with that of the U.S. it would be 80,000 tons. Aluminium marketing has not until recently been vigorous in Australia. Given the drive, and a rate of increased consumption comparable to that expected for the world as a whole, a rise of consumption in Australia to 100,000 tons annually by the 1970's would not be out of balance.

Whoever goes ahead with a larger reduction plant in the future in Australia must play a leading domestic role in fabricating, and in market development. Vigorous expansion of the market might be further implemented following vertical integration of the industry, as has been amply demonstrated by the major producers elsewhere. The immediate objective, could well be the initiation of such a plant, aiming to lift capacity to 100,000 tons by the 1970's. The capital requirements would be great — of the order of £100,000,000 for plant up to the capacity mentioned. Taxation amelioration might well be an important factor.

TOO MUCH DIVERSITY OF EQUIPMENT ?

Mining suffers far more than most industries from highly variable working conditions, in respect of both geology and human skill, which militate against standardization of method or machine. Nevertheless the overall impression left by the Mining Machinery Exhibition at Olympia, as also by similar recent exhibitions in other countries, is that the miner is being offered an unnecessary diversity of comparable duty equipment. This is probably less apparent in the United Kingdom, which draws almost exclusively on machinery of British manufacture, than in other parts of the world, where the miner is subject to competitive selling from Britain, the United States, Germany and other industrial countries.

Up to a point the miner naturally stands to benefit from freedom to choose between keenly competitive products. When product diversification is carried too far, however,

a stage is reached where he is losing more from the intrinsically high cost of small batch production and of the sales overheads inseparable from exporting a small output to world-wide markets, than he is gaining in tighter profit margins and keener and more individual sales engineering services. Certainly, in so far as any one mine or mining group multiplies the types of machinery which it uses beyond the technical requirements of the situation, it is adding to its costs not only in training operators and mechanics in the use and servicing of such equipment, but equally in maintaining an unnecessarily large and varied spares list.

It is a common experience that highly competitive markets lead manufacturers to seek the economies, alike in design, production and sales, which flow from the thinning out of an excessive variety of product types. This trend, which is already manifest in certain other industries, has not yet gone very far in mining machinery (at least in the Western world), but then it is only in recent years that international mining machinery markets have become so intensely competitive. Sooner or later, if it persists, this competitive pressure will accelerate a trend towards product rationalization, and once the initiative has been taken by any industrial country, the others will be forced to follow.

The extremely high cost of export selling to the mining industry, together with the shortage of high calibre sales staff, seem likely in any case to force upon some British manufacturers the establishment of co-operative export groups, either for single limited objectives or on a permanent basis for certain territories. One of the obstacles to the growth of such mutual self-help lies in the difficulty of building up a co-operative export group of manufacturers who are not offering competing products. Rationalization at the factory end would go far to clear the way for wider co-operation in developing and expanding the overseas markets to which the British mining machinery manufacturer must turn increasingly in the years ahead.

JAPANESE IMPORT OF IRON ORE FROM INDIA

The Japanese steel industry has planned to import 10,300,000 tons of iron ore in the current financial year according to the Japan Iron and Steel Federation. This compares with 7,580,000 tons imported in the 1958-59 financial year.

Purchases already decided upon by the steel mills include 3,350,000 tons from Malaya, 1,900,000 tons from Goa, 1,200,000 tons from the Philippines, 800,000 tons from Canada, 400,000 tons from the United States, 330,000 tons from Brazil and 120,000 tons from Africa. In addition, the steel mills have planned to import another 2,200,000 tons from Canada, India, Hong Kong and other sources. The increase in iron ore imports is said to be necessary because Japanese steel mills plan to increase the output of pig iron from 6,960,000 tons in the last financial year to 8,600,000 tons in the present financial year.

India will export 2,000,000 tons of iron ore to Japan every year. This would not stand in the way of India's steel production, stated Sardar Swaran Singh, Minister for Steel and Mines, Government of India. He said that with the estimated total deposits of 20,000,000,000 tons of iron ore in India, India would be in a position to export the commodity for some time.

The total output of iron ore in India in April this year, was estimated at 587,000 tonnes, according to the Indian Bureau of Mines. This brings the total production since January this year to 2,498,000 tonnes as compared with 2,026,000 tonnes in the corresponding period of 1958.



AUSTRALIAN ALUMINIUM—I

The Cape York Peninsula

THE Weipa bauxite deposits are situated on the west side of Cape York Peninsula, Queensland, and are part of an extensive laterite area extending from Vrilya Point in the north to Archer Bay in the south—a distance of 150 miles—and continuing inland for up to 30 miles.

By the end of 1956 it was established that these bauxite deposits were very substantial and of a grade suitable for the manufacture of alumina. At the same time the possible creation of an integrated aluminium reduction industry began to present itself. Commonwealth Aluminium Corporation Proprietary Ltd. (Comalco) was formed by Consolidated Zinc Corporation Ltd. in December, 1956, to advance these possibilities.

The similar interest of Consolidated Zinc Corporation Ltd. and The British Aluminium Co. Ltd. in the possibility of alumina and aluminium production in Australia suggested a basis for association. In January, 1957, Consolidated Zinc and British Aluminium agreed to become equal shareholders in the newly formed Commonwealth Aluminium

Bauxite Deposits

The following article, the first of two instalments, is extracted from a paper presented by H. J. Evans, chief geologist, Commonwealth Aluminium Corporation Pty. Ltd., at a symposium held in Brisbane on July 16 and 17, 1959, by the Australasian Institute of Mining and Metallurgy, Southern Queensland Branch, the Australian Institute of Metals, Brisbane Branch, and the Royal Australian Chemical Institute, Queensland Branch

Corporation Proprietary Ltd. The object of this association was declared to be the production of alumina on the Australian mainland and the smelting of aluminium in Australia or its territories.

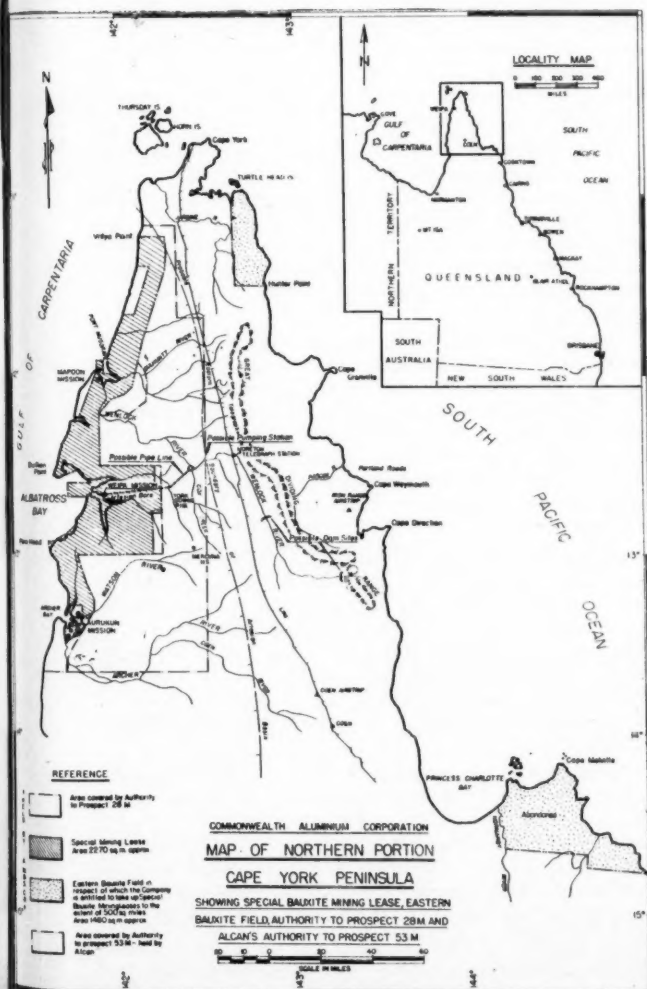
Access and Transport

The Weipa area is more or less isolated from the rest of Queensland and the only land access is from Coen via York Downs cattle station. This access road is merely a track through the scrub and prior to 1955 was little used except by horses. During the wet season this route is impassable due to boggy black soil flats and flooded rivers. Personnel and supplies are now transported to the area by air and a regular bi-weekly air service is maintained, by Ansett-A.N.A., via Cairns and Horn Island. The vehicles, buildings and general equipment used in the exploration work were transported by sea in shallow-draft coastal boats. A shallow bar occurs in Albatross Bay at the entrance to the Embley and Mission Rivers but a good sheltered anchorage is available in the Embley River at Weipa.

The bauxite areas of primary interest are separated by wide river estuaries and the tidal influence in the rivers extends up to 30 miles inland. These rivers and estuaries offered a serious obstacle during the early exploration and direct land routes were virtually impossible. To establish and maintain operations in the areas north and south of Weipa, launches, landing barges and light aircraft were utilised. Landing strips were established at key points and food supplies and personnel movement were effected by the use of Auster aircraft and helicopters based on Weipa.

The Weipa Bauxite Formation

The bauxite, which consists of a mixture of trihydrate (Gibbsite) and monohydrate (Boehmite), occurs as a flat-lying to gently-dipping laterite varying in thickness from a few feet to 30 ft., overlying the sands, clays and silts of probable Tertiary age. The laterite can be divided roughly into two main zones. The upper zone, which constitutes the main bauxite ore, is strongly pisolitic. The pisolites are spherical and vary in size from 10 m.m. to 200 m.m. in dia. and are mainly uncemented. They consist of minute concentric rings probably built up around a nucleus. Occasionally, the larger pisolites are found to have hollow centres containing several small uncemented pisolites in addition to clay particles and sand grains. In some localities a surface-hardened zone up to 3 ft. thick



occurs but generally the deposit is loosely compacted to friable.

The second zone consists of nodular to spherical pisolites, irregular ironstone concretions and fragments of partly bauxitized sandstone and siltstone. This zone is usually more compact than the upper bed and the nodules and pisolites are bonded together by red, brown and grey sandy clay. The nodules invariably contain a considerable core of sandy clay and appear to represent an arrested stage of lateritization where the process of weathering and leaching has been replaced by precipitation, thus arresting the decomposition of the original rock. Thickness of the zone varies from 3 ft. to 15 ft.

The amount of monohydrate in the bauxite varies considerably, ranging from a few per cent to as high as 40 per cent in a few exceptional cases. Although some anomalies occur, definite distribution patterns have been observed. As a general rule the amount of monohydrate decreases with depth, the very high percentages usually being confined to the upper 3 ft. to 6 ft. of the vertical section. The distribution of silica in the bauxite is also very irregular but, like the monohydrate, definite distribution patterns have been observed. Within the pisolitic zone there is a general decrease of total silica with depth down to about two thirds of the total bauxite zone. Below this point the silica tends to increase again.

Extent of Bauxite

The Tertiary laterites in Cape York Peninsula cover an area of at least 500 sq. miles but not all of this laterite can be classed as bauxite. The term bauxite is rather broad and ill-defined but is generally accepted as meaning an ore of aluminium in which aluminium hydroxides predominate over other minerals. Economically the definition of a bauxite is related to the amount of available alumina and silica content. The grade of bauxite that is considered economic will, of course, depend on the geographic position of the deposit and the availability of raw materials and power.

In the Weipa area economic grade bauxite exists over an area of approximately 200 sq. miles and probably constitutes one of the largest single deposits of bauxite in the world. To prove the grade and tonnage in this vast deposit will require many years of detailed drilling. The drilling done to date has proved many millions of tons of economic grade bauxite and reconnaissance work so far completed suggests that the ultimate tonnage could exceed 1,000,000,000 tons.

Prospecting and Evaluation

The testing of the extensive flat-lying bauxite deposits has been carried out in two main stages — scout drilling at widely spaced intervals to give a broad picture of grade and thickness, followed by relatively closely spaced drilling or pitting in areas in which high-grade bauxite was indicated by the scout drilling. Because the bauxite is predominantly loose and pisolitic, standard diamond drilling methods could not be used and accurate and rapid sampling of the laterite required the development of special methods and modification of standard drilling equipment.

Scout Drilling: North-south and east-west lines were surveyed and cleared across most of the main laterite areas. The lines were spaced 4,000 ft. to 8,000 ft. apart and holes were drilled along these lines at 4,000 ft. centres. As the work progressed, areas of highest grade bauxite were selected for closer drilling.

Evaluation Drilling: Using the scout drilling lines as a base, north-south lines were surveyed and cut at 2,000 ft. intervals. Holes or pits were put down at 1,000 ft. and

2,000 ft. centres. Occasional intermediate holes were drilled at 500 ft. and 250 ft. intervals to check anomalies.

Drilling Methods and Equipment: Work carried out on outcrop and pit samples had indicated that the bauxite could be beneficiated by simple screening on a 10 to 12 mesh screen, thus eliminating the loose sand and clay between the pisolites. For this reason, it was important to avoid any crushing of the pisolites during drilling. Because of this, standard percussion drilling could not be considered and recovery of the loose pisolites with a standard diamond core barrel was almost impossible. Test drilling by hand using post hole diggers and augers indicated that accurate samples could be obtained by either of these methods.

Initially, 3 and 4 in. standard drilling augers were adapted for use with normal diamond drill rods and standard diamond drilling rigs were used as a power unit. Difficulty was experienced withdrawing the sample from the hole as the loose pisolites tended to drop from the auger spiral. To overcome this, flat-pitch augers were designed. This gave some improvement but dropping of part of the sample still occurred, particularly in dry ground. Next, a flat half-inch strip of iron was welded around the outer edge of the auger spiral to form a retaining lip. This considerably improved the recovery of the sample but some contamination was still experienced in individual foot samples due to the lip of the auger scraping the sides of the hole.

The hand-operated post-hole digger, used earlier on beach sand testing on Stradbroke Island, had been tried out on scout drilling and proved that clean accurate samples could be obtained by this method. These post-hole diggers were constructed from 3 in. or 4 in. standard casing with an overall length of 9 in., the lower 3 in. being slotted and formed into two cutters while the upper 6 in. formed the barrel to hold the sample.

It appeared that a combination of the slow drilling hand post-hole digger and the fast drilling spiral auger would be the ideal sampling tool for the bauxite. A new type of auger was then designed. This consisted of a standard spiral cutter of 1½ turns attached to a cylindrical barrel to retain the sample. The leading edges of the auger cutter were designed to give ¼ in. clearance on each side of the barrel.

This auger proved to be fast and accurate, eliminated contamination from the sides of the hole and gave 100 per cent recovery of the sample. In the experimental models the shell of the sample barrel was a fixed part of the drilling unit. The bauxite frequently packed quite hard inside the barrel and operations were delayed while each sample was removed. To overcome this a detachable shell was designed which enabled the removal of the sample with a minimum delay.

During the early phases of drilling various sizes of augers were used, ranging from 3 to 24 in. in dia. A number of test areas were drilled and various diameter holes checked for accuracy by sinking pits and check sampling at 1 ft. intervals. As a result of this work it was found that similar results were obtained whether a small or large auger was used. A 6 in. dia. auger was finally adopted as a standard, giving a good combination of rapid drilling and adequate sample size.

Sampling and Beneficiation: The standard 6 in. dia. auger now used in drilling produces about 32 lbs. weight of sample per foot drilled. Each foot of hole drilled is kept as a separate sample. The whole of the material obtained is placed in a canvas bag and labelled with the hole number and footage. On completion of the hole the samples are transported to the sampling department.

The samples are then examined and the amount of overburden determined. Usually this is no more than 2 ft. but the upper 3 ft. is usually put aside even if it contains

bauxite. The remaining samples are examined and the cut off zones determined on colour and general composition. The individual samples in each zone are then split in a Jones riffle to about 6 lbs. weight. This portion is put aside to make up a composite sample. The remainder is placed in the original bag and retained for further testing if required.

An equal weight from each 6 lb. sample is then taken and mixed to form a composite sample. The composite sample is then washed on a standard 10 mesh screen and the minus 10 mesh material discarded. The plus 10 mesh material is air dried and then split down in a Jones riffle to about 2 lbs. weight. The 2 lb. sample is then forwarded for assay and the remainder of the beneficiated material retained for check sampling and making composite samples.

Methods of Analysis : The bauxite samples from individual bore holes are normally analysed for total silica, quartz trihydrate and total available alumina. Samples representing prospect squares or evaluation blocks are subjected to a more detailed analysis. Total silica, quartz, total available alumina, iron, titanium, and ignition loss are determined. In addition, a complete analysis of the red mud, remaining after the extraction of alumina, is carried out and soda and alumina losses calculated.

Evaluation of Areas : To obtain an accurate tonnage factor, measured volumes of bauxite *in situ* were excavated and weighed. The bulk samples so obtained were then screened on 10 mesh screens and the percentage of plus and minus 10 mesh material obtained. As a result of these tests a figure of 21 cu. ft. was accepted as the amount of *in situ* bauxite required to give one ton of beneficiated bauxite (plus 10 mesh). To allow for possible loss during mining and transport, an arbitrary figure of 20 per cent was added making the final tonnage factor 25 cu. ft. of bauxite per ton of beneficiated material. In a standard 2,000 ft. by 2,000 ft. square this gives a factor of 160,000 tons per foot of depth.

As all evaluation drilling is carried out on a uniform grid system, the completed area consists of a series of 2,000 ft. by 2,000 ft. squares. These are called prospect squares and are numbered systematically. The grade of each square is calculated by multiplying the average value of each hole by the depth, adding the values so obtained and dividing the total values by the total depth. Tonnage for each square is obtained by a method which employs multiplying the average depth by a tonnage factor of 160,000.

New Discoveries In The Yellowknife

ONCE again the Yellowknife district in the Northwest Territories is in the forefront of Canadian mining news. Since the gold boom of the 1930's this famous mining camp has witnessed the development of such profitable operations as Giant and Consolidated Discovery. Now attention is again being directed to Yellowknife by Consolidated Northland's gold discovery in the Walmsley Lake region, 175 miles north-east of Yellowknife town. This company is part of the highly successful Byrne organisation and discoveries have also been reported by North Goldcrest, another member of this group. Two more Byrne companies, New Athona and Radiore Uranium, also have claims in this area, but there has been no mention as to whether or not they have gold showings.

The gold was found in well mineralised quartz located within an acid dyke or sill running in a general north-easterly direction. Grab samples have ranged from 1 to 4 oz. of gold per ton and from 3 to 5 oz. of silver. The first discoveries were made in three separate areas over a length of 600 ft. on Consolidated Northland ground. About 3,000 ft. away, on an adjoining group of claims held by North Goldcrest, indications of the same type of ore with visible gold has been found. The acid dyke has been traced for about 2½ miles, of which Consolidated Northland and North Goldcrest each hold one mile and New Athona the remaining half mile. It is possible that the dyke may have a much greater length, but it is largely obscured by overburden. The mineralised zone ranges in width up to 20 ft.

The Byrne family, originating in the old lead-silver camp of Wicklow County, Ireland, and with a century and a half of mining experience behind them, are deeply involved in the development of Canada's far-flung mineralised fields. Family participations, writes our Canadian Correspondent, range from exploration and development to the operation of producing mines.

The Byrnes are led by 74-year-old John Jerome, whose experience in mining dates back to the turn of the Century. Self-made but trained by his late father — another early operator in Canadian mining — J.J. is today ably assisted by his three sons. These are Jerome Cotter, a graduate of economic geology from Queen's; Norman Wilfred, a Queen's graduate in mining engineering; and Robert Howarth, with three years' experience in geology at Queen's before the war interrupted his studies. Their latest high-grade gold find in the Yellowknife district has all the "earmarks" of a major discovery. If so, the Byrnes will have won yet another new source of wealth for Canada.

The Byrnes are currently riding herd on ten mining corporations; not an unusually large number for this type of business, where it is common practice for some promoters to direct up to 65 companies. The important thing, however, is that almost one-third represent producing mines. These companies are as follows: Radiore Uranium Mines Ltd., Consolidated Discovery Yellowknife Mines Ltd., Rayrock Mines Ltd., Consolidated Northland Mines Ltd., New Athona Mines Ltd.; North Goldcrest Mines Ltd.; Viking Yellowknife Gold Mines Ltd.; Circle Yellowknife Gold Mines Ltd.; Rockdale Mines Ltd.; and Ormsby Mines Ltd.

The ten companies in the Byrne fold hold extensive acreage in many mining camps extending from the Atlantic to the Pacific and north to just below the Arctic Circle. But it would appear that the Yellowknife and Mattagami camps, the latter in Quebec, hold most promise at the moment for the location of new mines.

In Mattagami, Radiore is drilling off a copper, zinc, silver, gold showing. In Yellowknife the Taurcanis mine, an associated venture, is developing underground what looks like a new gold producer for the future.

Currently most companies in the Byrne organisation are pinning new hopes on the high-grade possibilities of the recent discoveries at Yellowknife.

Machinery and Equipment

New Nylon Conveyor Belts for N.C.B.

Nylon figures prominently in new types of conveyor belt which are now being bought on a small scale by the National Coal Board. Under a new scheme designed to encourage the development of belts incorporating man-made fibres, the Board has started to grant "limited approval" to selected belts. The majority of the belts in the first batch are made partly from nylon.

As a result of work carried out during the past two or three years, the Board believes that judicious use of man-made fibres will make it possible to increase the service life of conveyor belting by 50 per cent or even more. To provide manufacturers with incentive to produce such belts, the Board has introduced a "limited approval" scheme under which quantities of about 50,000 to 100,000 ft. of promising-looking belts will be bought in order to gain operational experience in the field.

Normally the belts which are granted limited approval will be chosen as a result of laboratory assessment at the Central Engineering Establishment at Bretby, Derbyshire, and the Scientific Department of the North-Eastern Division at their laboratories near Rotherham and subsequent small operational pit trials at the coal face in No. 3 Area, N.E. Division. This procedure is not inflexible, however, and alternative preliminary tests may be used at the Board's discretion. After operational experience has been obtained with the initial quantity of about 50,000 or 100,000 ft. the new belts will be considered for full approval.

Nearly all the fully-approved nylon-mixture belts are solid woven. Nylon has been used for this type of belting

for some years past and has proved outstandingly successful, particularly under the gruelling conditions at the coal face. The use of nylon in plied belting, however, is a more recent development and it is on this type of belt that the main interest is focused since it accounts for the bulk of the N.C.B.'s purchases. All the leading British manufacturers of conveyor belting have been carrying out their own investigations into the possibilities of using nylon in plied belting.

The majority of belting manufacturers consider that the use of nylon offers the most attractive means of achieving greater weft strength. The yarn has a tenacity of 8.8 grams per denier and is substantially stronger than any other textile yarn which can be used for the purpose. This yarn, 840 denier Type 600, was developed by British Nylon Spinners Ltd. in 1956 specially for belting and tyre cords. Besides its tremendous strength it has a number of other properties which make it particularly attractive for belting. It has greater shock strength than any other fibre and greater abrasion resistance. It has very high flex strength and wet strength. It cannot rot. Investigation has shown that, broadly speaking, if the cotton weft of a belting duck is replaced by a nylon weft of about one-third the weight it is possible to produce a substantially stronger and tougher conveyor belt for very little increase in cost.

NEW PUMP DESIGN

The Hydraflo pump manufactured by Tangyes Ltd. is a complete departure from the traditional conception of a reciprocating pump and has already

been proved successful in what are probably the most rigorous conditions available. The first two to be made have been subjected to strenuous tests by the National Coal Board who are using them for the high-pressure supply of water for deep-hole infusion for which they are claimed to be proving satisfactory.

The pump, designed for coal infusion duty, is capable of outputs of 1,000 g.p.h. at 1,500 lbs. p.s.i. or 500 g.p.h. at 3,000 lbs. p.s.i. But although the design has so far been applied only to colliery work the potential field is wide in the extreme. Development in the immediate future has higher pressures and quantities in mind, such as pressures up to 6,000 lbs. p.s.i., outputs up to 3,600 g.p.h. and powers up to 50 B.H.P.

In principle, oil hydraulic power is used to reciprocate the plunger instead of using the conventional system of gears, crankshafts, and connecting rods. In applying this principle the drive is "in line" and consequently there are no heavy pressures on bearings and no high torques which are associated with the design of crank driven pumps. The initial motive power is provided by a normal 1,450 r.p.m. induction motor.

Compact in design, the overall measurements of those Hydraflo pumps already developed for coal infusion, are 5 ft. 2 in. long, 2 ft. 2 in. wide and 3 ft. 2 in. high. They are a dual-pressure range version and the change over from one pressure to the other is made smoothly and easily without stopping the pump. Their gross weight is 25 cwt. (including electric motor and the oil) and because of their smooth running they need no foundation.

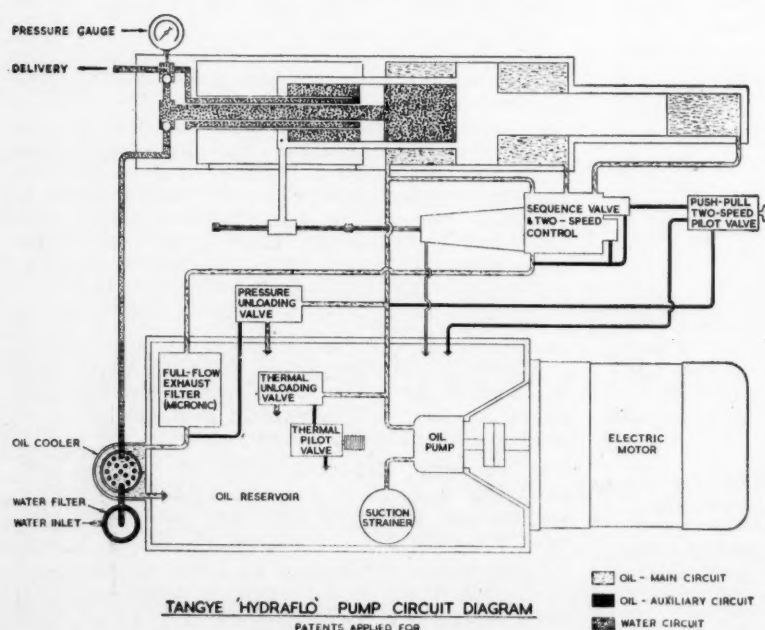
The electric motor is direct coupled through a flexible coupling to a high speed oil pump. Oil is drawn from the tank through a suction strainer and delivered to a sequence valve, which controls the flow of oil to the driving cylinder. The oil piston assembly reciprocates and as it is integral with the water cylinder, pumping is achieved.

DUMPERS GO UNDERGROUND

The main haulage drift of the Tytyri underground limestone mine in Southern Finland is being extended to serve new mining areas and the disposal of development rock from excavations 600 ft. underground is being dealt with by rubber-tyred haulage.

The haulage drift — 13 ft. high by 15 ft. wide — is sited close to the footwall contact between the limestone and a bed of laminated rock made up of quartz, feldspar and mica. Excavation is carried out with a heading and a bench round, the upper section of the drift being broken with a slipping round while the bench remaining is removed with horizontal holes.

For mucking in this heading a 1,200 m.m. wide scraper blade powered by a 32 h.p. hoist is used in conjunction with a scraper and ramp from which a Muir-Hill 10B 3 cu. yd. Dumper is loaded.



MINING MISCELLANY

The Finnish mining company Outokumpu OY has received, via the Mortgage Bank of Finland, a loan of 50,000,000 D-marks from Kreditanstalt fuer Weideraufbau in Frankfurt am Main. The loan period is for 15 years. The credit will be used to finance a mining project in the Pyhaesalmi ore field, discovered a year ago, which is regarded as the most important of Finland's many new ore discoveries. It contains copper, zinc, precious metals and considerable quantities of iron pyrites. The new mine is expected to have an initial output of 600,000 tonnes and proved reserves are said to be sufficient for 30 years' working.

★

Total exports of iron ore from the Union of South Africa in June alone were more than double those in the whole of 1958, and exports for the first six months of this year were more than six times last year's total tonnage. As a result of the rapid growth of this new export industry for South Africa, Fritzmoor Exploration, which at present ships some 15,000 tons monthly, has set itself a target of 500,000 tons for 1961. Mr. M. Beiles, managing director of the firm, is flying to Japan this week to negotiate new export contracts.

★

At Agecroft Colliery in No. 1 Area of the National Coal Board's North-Western Division, an advance, claimed to be a record for any colliery in the U.K., of 81½ yds. during five days ending 9 p.m. on June 13, 1959, was made by the contractors, the Associated Tunnelling Co. Ltd. A total of 123 hours was worked in 15 shifts of eight hours each. The tunnel is 15-17 ft. wide by 13 ft. high internally and is driven at a gradient of 1 in 350. It is supported by 79 3-piece standard arches set at 3 ft. intervals. A total of 123 manshifts was worked by face crews of six men, including a chargeman, with two 12-hr. foremen for general supervision. Haulage was by battery locomotive. The output at the face was 14.75 cu. yds./manshift and the area of excavation approximately 27.77 sq. yds. Drilling was carried out with 8 Atlas Copco BBD 41 rock drills mounted on BMK pneumatic pusher legs, and 9 ft. long drill rods with Wragg bits were used. An average of 55-60 holes 9 ft. deep were drilled per round to pull 8 ft. 6 in. Filling was by means of two Eimco 21 rocker shovels loading into 59 cu. ft. capacity mine cars, at an average of 65 cars per round.

★

It is reported that the Japanese copper industry is planning to send a technical survey team of three or four experts to Australia in September to investigate copper mining at Ravensthorpe in the south of Western Australia. An official of the Mitsui Metal Mining Co. is quoted as stating that Japanese copper producers have been asked by an Australian interest to invest between £140,000 and £150,000 in the shares of the Ravensthorpe Copper Mining Co.

A pilot plant that might save the Central African Federation £700,000 a year is nearing completion in the Sabi Valley, about 40 miles from Inyazura. The purpose of the plant, which is being constructed by Darowna Minerals, a subsidiary of African Explosives and Chemical Industries (Rhodesia), is to prove that phosphate in the apatite deposits at Darowa can be economically mined and used in the manufacture of superphosphate. Should the project prove successful, it would no longer be necessary to import phosphate rock from Morocco.

★

The Swiss chemical company, CIBA AG, of Basle, has announced that it is developing processes for the extraction of niobium and tantalum of high quality.

★

Preliminary investigation has shown that economically workable deposits of fluorite exist in Rajasthan. India's fluorite requirements have so far been filled by imports, which amounted in 1957 to some 8,000 tons.

★

The Geological Survey of Canada has placed 76 parties in the field this year, comprising a total of 325 men. The programme includes four major reconnaissance projects covering approximately 160,000 sq. miles of Canada's

northland. These are Operation Pelly in Yukon; Operation Coppermine in the District of Mackenzie; a reconnaissance of Banks and Victoria Islands, District of Franklin, in the Northwest Territories; and the completion of Operation Fort George west of Schefferville in Quebec. Another feature of the programme is a pilot survey of the Trout Lake area of the Red Lake mining division, north-western Ontario, which is expected to provide data needed for more extensive Geological Survey operations in this section in 1960-61.

★

For the fourth consecutive month gold production in South Africa has established a record. According to the Transvaal and O.F.S. Chamber of Mines, total output in July was 1,749,382 f. oz., compared with 1,699,968 oz. in June, 1,672,311 oz. in May, and 1,653,706 oz. in April.

★

It has been stated by various geologists that the portion of Somaliland under Italian Trusteeship, which is to become independent as from Jan. 1, 1960, is comparatively rich in uranium-bearing rock. The mining section of the Italian National Nuclear Research Committee—Comitato Nazionale Ricerche Nucleari (CNRN)—is accordingly planning to carry out an extensive surveying campaign in the regions concerned.

The first six high flotation Terratired oilfield vehicles made in the U.K. will be used by Shell Condor S.A. to carry heavy equipment over swamps hitherto only approachable by helicopter. They are standard Bedford trucks adapted to the design of Shell engineers and modified by All Wheel Drive Ltd. Fitted with giant Terratires which have a ground bearing pressure of less than the 6.5 p.s.i. exerted by a man, they can carry a load of 4,000 lbs. in swampy areas. In conjunction with special Dyson pipe trailers, also equipped with a lightweight bogie and four Terratires, they can transport up to 10,000 lbs. of line pipe. The obvious applications in mining are of particular interest



PERSONAL

Sir Charles C. G. Cumings, has resigned from the boards of the following companies in the Anglo American Group: Bancroft Mines Ltd.; Nchanga Consolidated Copper Mines Ltd.; The Rhodesia Broken Hill Development Co. Ltd.; Rhodesia Copper Refineries Ltd.; Rhokana Corporation Ltd. Mr. R. N. C. Boys has been appointed in his stead.

★

Sir Charles C. G. Cumings has resigned as a director of Rhodesian Anglo American Ltd. Mr. E. S. Newson has been appointed in his place.

★

Mr. J. P. Elliott, secretary and director of Davey, Paxman & Co. Ltd., Colchester, has been appointed assistant managing director of the company.

★

Mr. R. B. Hagart has been appointed a director of Johannesburg Consolidated Investment Co. Ltd. Mr. D. A. B. Watson has been appointed as deputy chairman of the board.

★

British Insulated Callender's Cables Co. Ltd. have announced the retirement of Mr. W. G. Hendrey, who has been a director since 1938. Mr. William Fraser has been appointed a director of the company.

BRNO'S FIRST INTERNATIONAL TRADE FAIR

The three exhibitions of Czechoslovak engineering held in Brno in 1955-1957 aroused considerable interest, but on these occasions only domestically produced machinery was shown. This will not apply to Brno's First International Trade Fair, to be held from September 6-20, at which machinery from all over the world will be on view.

The First International Trade Fair at Brno will not be of a general character, the exhibits displayed being limited to specific items — primarily machinery, engineering and metallurgical products.

The exhibition grounds, which cover a total of 520,000 sq. metres, are situated in close proximity to the city's centre. A total of 65,000 sq. metres of pavilions and halls and approximately 60,000 sq. metres of open-air space have been made available.

Exhibitors will be on the one hand the Czechoslovak foreign trade corporations and on the other foreign countries and firms. The latter will either stage collective exhibitions or will exhibit their products according to branches. Exhibitions arranged according to branches will present products of similar types of both domestic and foreign exhibitors. Approximately 30 countries from Europe and overseas will be represented.

CENTENARY OF THE OIL INDUSTRY

On August 27 will fall the 100th anniversary of the foundation of the modern oil industry. In recognition of this occasion the Petroleum Information Bureau has published a booklet, outlining the history of the oil industry.

Copies of the booklet are obtainable on request to the Petroleum Information Bureau, 29 New Bond Street, London, W.1.

Metals and Minerals

The long-term outlook for producers of columbite-concentrates has brightened considerably in recent months, due to the growing interest in columbium metal, of which U.S. production more than doubled in 1958. The quest for materials capable of meeting more rigid mechanical and chemical specifications is directing increasing attention to columbium's unusual properties, while the production of the metal in pure form by new techniques is opening up a wide field of promising applications.

"Is columbium headed for a boom?" asks *World Mining* in an article quoted in the July issue of *Tin*. "The opinions of those who should know tend to be highly optimistic. The conservatives among this group say that production of columbium will be measured in thousands of tons annually, perhaps within five years. The extremists see a monthly output between 1,000 and 4,000 tons per month by 1968, when they say the price per lb. will be in the \$4-\$6 range. It is currently \$55-\$85."

These forecasts, it is stated, relate to an industry based on production of pure ingots and mill products. They do not take into account the already established output and consumption of ferro-columbium used as an alloy additive in the production of stainless steel, but this application should also show expansion in the years ahead.

Until just recently, it is pointed out, development of markets for high-purity columbium was limited by the sky-high prices, but new production techniques now hold promise for slashing costs. When the price comes down the metal will attract and capture new markets.

In surveying the possible applications of columbium, *World Mining* suggests that the use of pure columbium will fall into three broad categories. Sheet tube and foil will comprise a major market. Applications of the metal in this form will fall in the fields of atomic energy, the chemical industry, electronics, and marine use. The properties of columbium that will attract attention in these fields include its low nuclear cross section, its strength at high temperatures in inert atmosphere, and its corrosion resistance. The unique workability of columbium may account for potential new uses involving complex shapes that would ordinarily have to be made by castings.

Columbium-base alloys may develop into a market of considerable importance. Applications in this category are dependent on perfection of high-temperature, oxidation-resistant alloys rich in columbium. When and if these alloys become available, the largest use will probably be in gas turbine engines.

The third market for pure columbium will be as an alloy additive to other metals such as iron. The only example so far of such an alloy is the 90 per cent uranium, 10 per cent columbium alloy for cladding nuclear fuel elements. To what extent the more optimistic predictions are justified, only time can tell. Meanwhile, as an

The Widening Horizons of Colum

indication of the extent to which columbium's horizons are already widening, it is noteworthy that stainless steel producers who have used "Vancoram Thermocol" as a ladle addition are reporting savings of \$7 per ton or more, as compared with additions of conventional ferro-columbium. A furnace time saving of up to 30 minutes is another important gain. "Thermocol" is a new exothermic ferro-columbium alloy developed and produced by Vanadium Corporation of America. These new exothermic ferro-columbium alloys, it is considered, might well find uses in types of stainless and heat-resistant steels where columbium is not specified, and also in low alloy and carbon steels.

NICKEL PLATING

The interim report of the International Nickel Co. of Canada Ltd. and subsidiaries for the six months ended June 30, 1959, shows net earnings in terms of U.S. currency of \$38,391,000, equivalent to \$2.63 per common share. For the corresponding six months of 1958 net earnings were \$21,401,000 or \$1.46 per common share. The major contributing factors were an increase of over 50 per cent in the rate of nickel deliveries in all forms and the improvement in the market price for copper. Fears of the steel strike in the U.S. contributed to the heavy second quarter demand for nickel from that industry.

In a letter to shareholders accompanying the interim report, Dr. John F. Thompson, chairman of Inco, discusses nickel plating, one of the oldest uses of metallic nickel. Nickel plating at present accounts for about 15 per cent of the free world's nickel consumption. In the future, the plating industry will be a still greater consumer of nickel, since it has tremendous potentialities.

The largest use of nickel plating is in the production of durable and attractive metallic finishes for manufactured articles, ranging from costume jewellery to motor car bumpers. The motor car industry is the largest consumer of nickel for plating. A major advance has been the development of the so-called "duplex" nickel plating system in which two successive layers of nickel are deposited, imparting marked improvement in corrosion resistance and quality of finish. Costly buffing and polishing operations are virtually eliminated and service life is extended.

TURKISH CHROME EXPORTS

The Turkish Chrome Committee, representing private mine owners, reports that private exports in 1959 are expected to reach 210,000 — 290,000 tonnes of chrome ore, compared with 600,000 — 700,000 tonnes annually over the last few years. The committee also reports that under an agreement concluded between a Turkish firm and a German firm about 15,000 tons will be delivered to West Germany this month.

Columbium

QUICKSILVER PRICE REDUCTION

The fall in the London ex-warehouse price for quicksilver from £75 to £74 10s. and subsequently £74 occasioned no surprise, since the market had been looking rather shaky and holidays are accentuating the quietness of demand. Moreover, a certain amount of metal is available at competitive prices from some of the smaller producing countries, such as Chile and Mexico.

INDIA'S BAUXITE RESOURCES

The Italian firm, Montecatini, appointed by the Madras Government to estimate the quantity and aluminium content of bauxite available in Salem district, has found the ore suitable for the production of aluminium. In their report to the State Government, the experts are under-

stood to have expressed the opinion that over 2,000,000 tons of bauxite grading between 39 and 44 per cent was available in the district. This would be sufficient to supply a 10,000-ton aluminium plant for 25-30 years or a 20,000-ton plant for 16-18 years. A 10,000-ton plant was estimated to cost 100,000,000 rupees. A committee of industrialists in the State is now taking steps for the establishment of an aluminium producing industry in Salem district.

LONDON METAL AND ORE PRICES

The following prices, as quoted on August 13, 1959, have changed during the past week:

Gold 249s. 10½d., silver 79d. spot, 78½d. forward, quicksilver £74 ex-warehouse.

COPPER • TIN • LEAD • ZINC

Markets have again been dominated by the situation in the American copper industry and at the time of writing Magma, the Kennecott Western Division and the Phelps Dodge Refinery at Laurel Hill are idle and it is expected that the strike will spread within the next seven days. Strike action against Anaconda is to begin next week. The position has resulted in a rise in the customs smelter price to 30 c. per lb. and the Belgian price to the equivalent of approximately 29½ c. per lb. New York or Antwerp: dealer copper is reported to be available at 32 c. per lb. and the prices on both the London Metal Exchange and on Comex have risen considerably. Some observers feel that no settlement is likely before labour day in either the copper or steel strikes. Should this opinion prove to be accurate, then the stocks held by fabricators should be sufficient to avoid the commencement of any panic buying but should the strike last longer then it is possible that very much higher prices may be seen in the last quarter of the year, otherwise it is believed that the present price level will probably rule.

The lead and zinc markets have also maintained their firmer undertone. The price of the latter shows a noteworthy improvement and it is expected that this tendency will continue, as cuts in production or export promised at the last U.N. meeting are now beginning to be felt. There are rumours of labour unrest among American lead smelters.

The tin market remains featureless and no change in price level is expected until the settlement of the U.S. steel strike when renewed demand should cause an increase in quotations. On Thursday the Eastern price was £812½ per ton c.i.f. Europe.

SUMMARY OF RECENT STATISTICS AND INFORMATION

Kennecott half-year report: This report states that total consumption of copper by U.S. fabricators in the first six months 1959 averaged 122,800 s. tons per month as compared with only 90,400 s. tons the corresponding period of 1958.

U.S. copper consumption: Domestic consumption by brass and wire mills and foundries based on their shipments of fabricated products in June totalled 133,578 s. tons against 124,060 in May. New business and unfilled orders both declined and stocks at the end of June totalled 492,072 s. tons against 474,657 at the end of the previous month but orders on hand with producers showed a decrease of approximately 22,000 tons.

U.S. lead and zinc consumption: A government survey indicated that the U.S. consumption of lead in 1959 is expected to rise more than 10 per cent and the consumption of zinc by about 15 per cent.

Zinc stocks: To emphasize the sharp reduction in stocks in the hands of U.S. producers during the last twelve months it is repeated that at the end of June this year they stood at 169,386 s. tons against a peak of 257,911 s. tons at the end of July 1958.

Polish zinc production: The production for the first half 1959 totalled 83,300 tons.

U.S. Tariffs: The U.S. Tariff Commission is to investigate "the harm being done to the domestic lead/zinc industry by the importation of lead and zinc products outside the quota system".

Chilean copper exports: 216,900 tonnes were produced in the first five months of 1959, this figure being an increase

of 37½ per cent over the corresponding figure for 1958. Export figures for the corresponding period were in 1959, 189,500 tonnes and in 1958, 162,400 tonnes.

Chilean copper cutback: A Chilean finance ministry statement said that Chilean copper companies might reduce operations owing to the present world consumption surplus.

Malayan tin shipments: Shipments from Singapore during July totalled 14 tons. Shipments from Penang totalled 2,903 tons. The corresponding figures for June were 102 and 2,764 and for July last year 478 and 3,059.

U.S. lead and zinc imports: By the end of the first five weeks of the new quota period, the other countries quotas for lead, zinc and zinc ores had been filled and also the Italian quota for zinc. Over 50 per cent of the remaining quotas had been more than half filled.

U.S. lead statistics: During the month of May mine production was 4 per cent less than in April and 9 per cent under the 1958 monthly average. Production imports totalled 109,600 s. tons whilst only 96,200 s. tons were consumed by industry. Producers' stocks, however, were substantially reduced, being down to 15,800 tons by the 31st May as compared to a peak of 203,000 tons at the end of February.

U.S. zinc statistics: Deliveries in July only amounted to 60,454 s. tons as compared to 102,162 in June, with production only a little over 2,000 tons at 73,101. Stocks at the end of the month rose 182,033 from 169,386 beginning of the month.

O.E.E.C. zinc: Zinc production totalled 73,042 tonnes in June compared with 73,384 in May. The June production was about 7 per cent above the production in June 1958.

O.E.E.C. lead: Production 50,432 tonnes in June as compared with 50,537 tonnes in May. June production is approximately 4 per cent higher than in June 1958.

London Metal Exchange stocks: Copper stocks for the week ending August 8 amounted to 15,283 tons, an increase of 317 tons over previous week. Tin stocks amounted to 8,725 tons, being an increase of 7 tons over the previous week.

Closing prices are as follows:

	Aug. 6 Bivers Sellers		Aug. 13 Buyers Sellers	
COPPER				
Cash ..	£226½	£227½	£236½	£236½
Three months ..	£226½	£226½	£235½	£235½
Settlement ..		£227½		£236½
Week's turnover		7,300 tons		14,625 tons
LEAD				
Current ½ month	£71½	£71½	£72½	£72½
Three months ..	£72	£72½	£73½	£73½
Week's turnover		5,275 tons		11,300 tons
TIN				
Cash ..	£792½	£793	£792½	£793
Three months ..	£790½	£791	£791	£792
Settlement ..		£793		£793
Week's turnover		845 tons		550 tons
ZINC				
Current ½ month	£83½	£84	£85½	£86
Three months ..	£82½	£82½	£84½	£84½
Week's turnover		5,025 tons		6,275 tons

After this week the report from our L.M.E. correspondent will re-appear in its full form, and statistics will be included in it.

Mining Finance

Fresh Records for S.A. Gold

The accompanying table clearly shows how in the current year the pace of expansion by the South African gold-mining industry has been speeded up. Thanks to the many young mines of the Far Western Rand, Klerksdorp, Orange Free State and Kinross areas, production and profits have been rising to new high records. The dividends in the table that are paid in the March and September quarters are those of the O.F.S. mines. Those of the June and December quarters include all the other new mines, as well, of course, as the old producers of the Central and Eastern Rand many of which are now in the declining period of their lives. The profit figures take in earnings from uranium and acid, but make no allowance for the repayment of and interest on uranium loans.

Most of the new mines have still a good way to go before they attain peak performance. So it is likely that further new records for output and profits will be reached before the point is arrived at when the growth of the new mines fails to offset the wasting trend of the older concerns. What may be termed the old Witwatersrand was still accounting last year for as much as 44 per cent of South Africa's total gold production and, incidentally, 39 per cent of the uranium. Its perennial cost problem, however, meant that its share of 1958 profits was only 13 per cent.

		Output Ounces	Profit £	Dividends £
1958				
	March quarter ..	4,206,047	23,170,987	6,096,331
	June quarter ..	4,359,471	24,358,945	14,494,245
	September quarter ..	4,501,405	25,633,898	7,203,754
	December quarter ..	4,598,816	25,934,441	15,606,290
	Totals	17,665,739	99,098,271	43,400,620
1959				
	March quarter ..	4,646,360	25,934,881	7,459,054
	June quarter ..	5,026,035	28,473,191	14,447,904
	July	1,749,382	—	—
	Totals	11,421,777	54,408,072	21,906,958

ARISTON ISSUE WELL SUBSCRIBED

The Ghana Government has come to no harm in its participation to the extent of 25 per cent in the underwriting of the new issue by the Ariston gold mine. Stockholders took up no less than 98.3 per cent of the 1,285,714 shares of 2s. 6d. which were offered to them at 3s. 3d. in the ratio of one for every seven stock units held. The resultant funds of just over £200,000 are needed for the major shaft-sinking and deep-level development programme. This programme is designed to ensure the continuity of the ore reserve position and consequent stability of output which, allied to operational flexibility should enable the mine to be worked at its economic peak. The ore reserves, incidentally, are already quite strong, being some five years ahead of the mill.

The June quarterly report showed that the property is still developing well. For instance, on the 13th level of the North orebody the length of pay zone disclosed so far amounts to 493 ft. with an average gold content of 7.5 dwts. per ton over the substantial width of 127 inches. This is an encouraging indication that this orebody, originally found on the 16th level, may extend

upwards still further. It is estimated that between the 13th and 16th levels the pay ore will amount to 163,000 tons. The 16th level values to date have been 6.9 dwts. over 143 inches for 392 ft., while on the 23rd level 148 ft. have given 13.3 dwts. over 74 inches.

Meanwhile, the No. 2 orebody is going down well. On the 27th level the most southerly crosscut showed 9.9 dwts. over 215 inches which, it is stated, augurs well for future additions to the reserves on this reef. Ariston's working profit of £368,600 for the first nine months of the current financial year to Sept. 30 is rather lower than in 1957-58 when £395,967 had been earned in this period, but the 2s. 6d. stock units at 4s. 7½d. can be valued on the official forecast by the chairman, Mr. C. J. Burns, that the dividend on the higher capital should be a minimum 20 per cent. The yield on this basis would be 10.8 per cent.

YUKON'S BID SITUATION

The mystery surrounding the Yukon Consolidated Gold Corporation bid situation has become no clearer following the annual meeting of the company in Toronto. The president, Mr. W. A. Arbuckle, said that so far none of the essential information requested by the company from the tentative bidders of 8s. 6d. per \$1 share has been received, but that conversations were continuing between Yukon's counsel and Knapp-Fishers, solicitors to the bidders, who so far have been hiding under an apparent cloak of anonymity. This, in fact, seems to be the nub of the situation. Until the bidders are identified the company can hardly be expected to reveal the kind of information that a bidder would naturally want to know.

In the meantime, Yukon's intensive exploration for fresh fields to conquer in Canada outside its Klondyke alluvial gold deposits has not so far met with any economic success, although, Mr. Arbuckle says, some encouragement has been received both in the joint exploration partnership with Consolidated Zinc Corporation of Canada in New Brunswick and with the Great Plains Development Company. The former exploration is for base-metals and the latter for oil. The value of the gold recovered from the seasonal operations on the Klondyke properties had by July 31 totalled \$768,000 against \$816,170 for the same period of last year when the final dredging before the winter shut-down took place in November. These operations, in fact, are always at the mercy of the weather.

Yukon pays a regular 6 cents per annum dividend, but last year took the unusual step of distributing this by way of an issue of Preferred shares which were almost immediately redeemed for cash at par thus effecting a useful tax saving.

Continued on page 150

LONDON MARKET HIGHLIGHTS

"Selectively firm" would probably be the best description of this week's South African gold share market. Although the general shortage of stock still persisted, it needed the occasional concentration of buying support to produce any real features.

At the start of the week the anticipated Cape demand failed to materialise and London found itself having to take the initiative. This it did by singling out stocks that appeared to have been overlooked in the recent market rise. As a result, Stilfontein (41s. 6d.), Doornfontein (32s.), New Pioneer (38s. 9d.) and East Rand Proprietary (45s.) all showed useful gains during the following days.

The sharp break that occurred on Wall Street affected share markets generally. In the event comparatively little selling developed and Gold shares soon recovered along with most other markets.

The rally in Loraine from 34s. 6d. to 36s. was hastened by Cape talk of four-figure inch-dwt. gold values being encountered in the No. 52 haulage which is being pushed out towards the rich T V 2 borehole area. A later feature developed when Western Deep Levels jumped to 42s. 6d. during a really big turnover. Heavy Johannesburg buying was apparently based on unofficial reports that the 16 level winze being driven into Western Deep from the neighbouring West Driefontein property had met high

gold values on the Ventersdorp Contact reef. At the same time West Driefontein jumped 6s. 3d. to 152s. 6d.

Finance stocks were sought after by both the Cape and London. Buying of Union Corporation (73s.) was again linked with hopes that a change of domicile and the consequent tax saving were coming nearer. Straightforward investment support was responsible for firmness in Central Mining (83s.) and General Mining (146s. 3d.).

After their recent advance, De Beers boiled over but after reacting to 172s. 6d. later recovered to 173s. 9d. A better feeling was again noted in the Platinum group, but prices made little headway.

Copper shares began to move ahead at last. The steady selling from Paris that has been noted in recent weeks dried up completely and with the U.S. strikes forcing the copper price up to £237 a ton buyers soon appeared here. They were particularly interested in the Anglo American group mines which offer relatively good yields. There was also a revival in the shares of the young M.T.D. (Mangula) mine to around 10s. 3d. The company's year ends in September.

In view of the brightening outlook for lead and zinc, it was understandable that some tentative support should have developed for the leading producers' shares. Among them Broken Hill South rose to 11s. 9d. and Cons. Zinc to 67s. 6d.

Malayan Tin's New Dredge

The Mentri Besar of Perak, Enche Mohamed Ghazali bin Haji Jawi, pressed a button at 11.0 a.m. on July 28 and put into operation the latest addition to the fleet of tin dredges owned and worked by Malayan Tin Dredging Ltd.

The new dredge, the second to be built in Malaya since World War II, and the first since the country became independent (although some have been rebuilt), brings the company's fleet to five. Only two, including the latest addition, are currently working owing to the output restrictions imposed under the International Tin Agreement.

The domestic control regulations in the Federation of Malaya permit a new installation to receive a special quota for the first year of working, after which it is to be re-assessed on its performance.

The dredge was designed by Paynes and constructed on the digging site by a Kuala Lumpur contractor, Mr. Kong Seong Soo, under the supervision of the company's own engineers, headed by the company's chief engineer, Mr. J. S. Clark. It has a length of 296 feet, a width of 70 feet and a displacement of 4,400 tons. The bucket band of 144 buckets can dig to a depth of 136 feet below water surface. The rated digging capacity is 400,000 cubic yards a month.

The dredge, although planned several years ago, was completed within 18 months, at a cost of about \$M 8,000,000.

Mr. P. A. Delmé-Radcliffe, the company's general manager, said at the starting-up ceremony that the life span of the dredge would be approximately 30 years. He pointed out that the land through which it will operate is deep swamp, quite useless for any other purpose, but after being mined it will be dry and well-drained, and suitable for planting. Mr. Delmé-Radcliffe also said that the investment of such a large sum of money on a long-term operation programme was practical evidence of his company's confidence in the future stability of the Federation.

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MR. H. F. OPPENHEIMER REVIEWS COPPER PRICES

The following is an extract from the statement by the Chairman, Mr. H. F. OPPENHEIMER, which has been circulated with the annual report and accounts:

The programme of expansion which was begun in 1947 and which, since 1954, has included the opening up of the Nchanga and Chingola orebodies as open-pit mines, is now almost complete. Although a large amount of capital will have to be spent in the current financial year, it is probable that capital expenditure will from 1960 onwards be reduced, unless it is decided at a later stage to embark on further projects or the opening up of additional orebodies.

At 31st March, 1959, the total amount invested in the mining property itself amounted to £32,643,000, of which £8,905,000 has been provided by the amounts charged to depreciation over almost twenty years. It is likely that after the end of the current year the annual depreciation charge will be sufficient to cover the major part of the annual capital expenditure and it will not be necessary to appropriate large amounts from profits in future. The directors have therefore decided that the time has come to bring the capital of the Company more into line with the total amount permanently employed. Substantial appropriations from profits for capital expenditure have been made over the years, and by 31st March, 1958, these amounted to £17,349,507. It was decided this year to appropriate £729,450 from profits for capital expenditure and to transfer £350,422 from general reserve to profits appropriated for capital expenditure, thus bringing the total appropriations to £18,429,379. This sum together with the issued share capital of £7,000,000 and the amount of £2,570,621 standing to the credit of the share premium account makes a total of £28,000,000 on capital account.

CAPITAL BONUS ISSUE

A preliminary notice of the directors' recommendation that a capital bonus issue of three fully-paid shares for each stock unit held should be made was published in the Press early in July. This will require the issue of 21 million new shares, and at the forthcoming annual general meeting you will be asked to pass resolutions increasing the nominal capital of the Company to £28,000,000 and approving the capitalisation of £21,000,000, which represents the whole of the profits appropriated for capital expenditure and the share premium account. We believe that this step will be in the interests of members as it places the capital structure of the Company on a realistic basis and will serve to make the stock units of the Company more marketable.

PRODUCTION AND PRICES

In accordance with the combined programme of output agreed with Rhokana Corporation and Bancroft Mines, Nchanga was scheduled to produce approximately 12,500 long tons of copper a month,

equivalent to 150,000 tons for the year. Nearly two months' output was lost because of the prolonged strike of European daily-paid employees towards the end of 1958, and furthermore, at the time of the strike, production was already slightly behind the scheduled rate for the year. It was nevertheless possible to make up this shortfall, and much of the lost production, by increasing output for the last four months of the financial year to 15,500 long tons a month. Production for the year was 139,442 long tons of copper, which is a record for the mine.

We sold a record tonnage of 129,024 long tons at an average realised price of £204 a ton, compared with £196 last year. The profit for the year, after providing for depreciation and tax, amounted to £4,704,000, which is £334,000 more than last year.

Your directors have recommended a final dividend of 9s. 6d. net per unit of stock which, with the interim dividend, will make a total distribution for the year of 12s. 6d. compared with a total of 10s. 0d. net per unit for the previous year.

During the year under review the price of electrolytic copper on the London Metal Exchange rose from £174 a ton at the beginning of April, 1958, to £248 at the end of March, 1959. Since that time the price has been considerably lower. At the moment of writing, world production is running at approximately 7½ per cent above consumption and in the United States consumers are holding considerable stocks which were built up in the expectation of supplies being interrupted by major strikes. It does not seem likely therefore that the price will rise appreciably in the near future unless the larger producers are prepared from time to time either to reduce output or temporarily to withhold copper from the market. I believe, however, that world consumption of copper will increase over the next few years and it is satisfactory that our mine is now well able to take advantage of any increased demand.

Prospecting work is continuing on the Chingola and Mimbula orebodies, while the River-Lode has been de-watered and is being revalued with a view to further prospecting. The calculated ore reserves are now 167,000,000 tons and the present work promises to add considerable ore to this figure. At the same time, research is proceeding on the metallurgical problems connected with the recovery of copper from the banded sandstones which lie above the main orebody. Results of this work are encouraging and, if a successful method of extraction can be evolved, large tonnages of low-grade ore could be drawn from current and old underground workings as well as from the Nchanga open-pit without further major expenditure on development.

Copies of the annual report and accounts may be obtained from the London office of the Company, 40 Holborn Viaduct, London, E.C.1.

MINING FINANCE—Continued

This method, which will presumably be repeated in future, enhanced the value of the shares which are now a very steady market in London at 6s. after having been up to over 7s. following the initial revelation of the bid position. Here is a situation in which holders are hardly likely to be tempted to sell.

SOUTHERN RHODESIAN GOVERNMENT: VACANCIES, GEOLOGICAL SURVEY DEPARTMENT. Applications are invited from qualified Geologists with practical experience in Economic Geology for two vacancies in the Exploration Section of the Geological Survey Department.

The appointments will be on a three year contract basis with salaries up to £2,000 per annum, based on qualifications and previous experience. Application forms and further details from: Secretary (R), Rhodesia House, 429 Strand, London, W.C.2. Closing date: September 15th.

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH: GEOPHYSICIST. Pensionable post (graded as Geologist or Senior Geologist) in Geological Survey and Museum, London, for man at least 21 on 1.7.59. Candidates should normally have 1st or 2nd Class honours degree in Geology, Geophysics, Physics, or Mathematics, together with a university qualification to at least first year standard in Geology and in Physics or Mathematics, or an equivalent qualification. Experience in Applied Geophysics an advantage. At least 3 years post graduate or other approved experience necessary for appointment as Senior Geologist. Duties are concerned with geophysical surveys in the field. London salary within the scales £655-£1150 or £1230-£1460, according to age, qualifications and experience. Provision for starting pay above minima. Promotion prospects. Write Civil Service Commission, 17 North Audley Street, London, W.1 quoting S5023/59. Closing date 25th September 1959.

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